Title:	**Human Safety and Regional Development: A Peruvian Experience**	
Contact(s):	Name:	Julio Kuroiwa
	Agency:	OAS, USDE
	Phone:	None
	Fax:	(202) 458-3560
	E-mail:	None
Hazards examined:	Earthquakes, floods	
Study emphasis:	Economic development, vulnerability assessment and reduction, land use planning and hazard/disaster mitigation strategies.	
Summary:	Offers a city and expansion areas hazards map detailing all potential natural disaster scenarios within the areas of interest (ranking each as high, medium or low). Study stresses careful and prudent land-use planning toward the goal of fostering disaster resistant and sustainable development practices. Main goal of the study is to prevent the occupancy of highly hazardous areas for urban settlement purposes.	

DEVELOPINC COUNTRIES CITIES ARE INCREASINGLY VULNERABLE TO INTENSE NATURAL EVENTS.

Because of the explosive population growth in developing countries, poor people in large cities are occupying with increasing frequency, marginal and highly hazardous sectors, where they build vulnerable dwellings resulting in a very high risk for their occupants. Since no effective action has been taken to reverse such a worrisome situation, disasters in the next century may be even worse than today's (Kuroiwa, 1995).

Earthquakes and floods are the two most frequent threats to people. The Colombia, Quindio Earthquake of January 1999, and The El-Niño effects in Ecuador and NW Peru in 1998 are two recent examples. The flooding hazard map of the main cities of Peru's N-W coastal region were drawn in 1998. As may be expected, the flooded sectors were, with minor differences, the same as those affected during the 1982-83 El-Niño. The knowledge and tools to develop sound urban centers exist (Kuroiwa et.al. 1978), (Kuroiwa, 1982), (Kuroiwa & Alva, 1991), but political decisions on the part of the central and local authorities are necessary.

ACTIONS TO REDUCE RISK IN URBAN CENTERS

In. I 995, at mid-IDNDR, it became clear that to reduce risk in urban centers much more needed to be done than developing practical useful theses on microzonation in the universities academic exercises. The political decision of the central and local governments to develop safe cities and to provide the necessary funds are absolutely necessary.

We were having a hard time getting the authorities to listen, then the 1997-98 El Niño occurred, and eventually caused about two billion USD in direct losses. The worst-hit area was again Peru's N-W region near the border of Ecuador where the Inter-Tropical Convergence Zone--ITCZ displaced south from its usual location north of the Equatorial line The lakes which provided water for the Panama Canal were almost empty but in Ecuador and northern Peru there was torrential rain. The 1982-83 El Niño also caused direct losses of some two billion USD, but the consequences remained for years because the productive facilities of N-W Peru were completely disrupted including the Panamerican Highway and other roads. The irrigation canals remained out of service for a long time, so the indirect losses were also huge.

Based on that negative experience of the previous catastrophic event, and the fact that El Niño indicators had shown that a large event was incubating. The El Niño-Southern Oscillation - ENSO had shown negative values and the abnormality of the Superficial Sea Water Temperature – SSWT was unusually high, which could by obtained by from NOAA/Internet. the Peruvian Government took a series of preventative actions during the second semester of 1997 and early 1998 to reduce the impact of El Niño. These measures where taken under the leadership of the president Mr. A Fujimori.

CEREN- The Executive Committee of Reconstruction of El Niño with is headed by the then prime minister Mr. A Pandolfi who continues as chief of CEREN, was appointed Minister of Transportation, Communication, Housing and Construction - MTC to be directly involved in the reconstruction task of the most affected sectors. In September 1998, by mutual approach, Mr. Pandolfi nominated the author as ad-honorem adviser of CEREN.

In November 1998, the author proposed to CEREN the development of Sustainable Cities I Stage which was accepted. At the same time the United Nations Development Program - UNOP that was already assisting CEREN approved its participation in the Program. At present this CEREN-UNDP program is being developed jointly. This requests from mayors of the places that were hardest hit by the 1997-98 El Niño to participate in the program have surpassed the capacity of the working group, so the necessary and important participation of the local universities in the program implementation has been agreed in a public ceremony held in Piura, Tumbes and Ica during the first semester on 1999.

SUSTAINABLE CITY DEVELOPMENT - SCD. FIRST STAGE-IS, SCD-1S

We define a sustainable city as one which is safe, orderly, healthy, attractive and efficient, in its function and development. If we are able to develop such a type of city, we can leave to the future generations sound urban centers, where the inhabitants will not have to suffer a drastic reduction in their standard of living because of an intense or extreme natural event. It is a very difficult task to implement, especially in Third World countries, but not impossible. In the long range, this may be another important task for the century starting in the year 2000.

In its first stage the objective is more modest: to reverse the increasing risk of the important cities of developing countries located in natural disaster-prone regions. As has been stated, the knowledge to do so already exists, and the decision to go ahead has been taken at the highest political level and also by local level authorities in Peru. This an opportunity and a challenge to succeed.

Approach of the SCD-1S

The strategy for success in group A, which includes 10 cities, is that the program is comprehensive, simple to apply and the process of approval of land-use planning results involves the conscious active participation of the citizen. The selected cities were severely affected by El Niño 1982-83 and 1997-98, except Ica was hit only by the last event. So the city mayors and the communities are highly motivated.

All the mayors have had working meetings with the CEREN - UNDP Working Group. They have readily requested to participate in the Program. Large municipalities such as Piura and Tumbes are also providing their own funds and have set up working groups.

The steps of the programs with some commentaries are as follows:

a) Initiative of the city mayor. Request to CEREN-UNDP to participate in the Program, which has already bean made by all the mayors of Group A cities.

b) Program formulation for each city according to a model developed. The program has already been formulated and field work is underway. Some cities have already concluded this portion.

e) Preparation of city and expansion areas hazard map. This is a simplified microzonation map. Six of the cities have microzonation investigation results in which the flood hazards have been drawn by the Nature in 1983 and 1998. The study includes all natural phenomena threatening the area of interest. The respective professional theses were developed at the Japan-Peru Center for Earthquake Engineering Research and Disaster Mitigation - CISMID/FIC at the National University of Engineennng UNI: CISMID FIC/UNI, Lima, Peru. The University of Piura and the National University of Piura are reviewing and improving previous investigations and will develop the studies for 3 new cities. The study for the city of lca was jointly made by CISMID FIC/UNI and the National University of Ica.

d) Land-use planning. Most of the plans are the responsibility of the National Institute of Urban Development - INADUR of MTC, but some private consultants are also participating. The Ica plan is in the hands of a local architect who developed her masters degree thesis at the graduate School of Architecture of the National University of Engineering, Lima.

e) Construction type selection, according to the characteristics of each hazard sector. (Please see comments, below).

f) Approval process: City Council (Provisional) -- Professional Associations -- Public Assembly -- City Council (Final).

g) Municipal Ordinance. The model ordinance in which all legal problems have been solved is ready.

h) Institutional strengthening of the participating municipalities to improve the municipal control.

The main aim of the Program is to prevent occupancy of highly hazardous areas for urban purposes. The geologists and architects have been especially advised to delimit such sectors carefully, for designation as ecological reserves and recreational areas.

The highest degree of hazard is “exceptionally high”, where the force of Nature is so strong that no man-made construction is able to take. For example the Huascaran avalanche during the 1970 Peru Earthquake which released 80 million tons of snow, mud and very large rocks. In sectors belonging to this category urban development is not permitted under any circumstances. In the cities under consideration, there are only a law areas in this category. Most of the cities have sectors of “high”, “medium” and “low” hazard.

Sectors included in the category of high hazard are, for example, areas which are flooded at low velocity, or soil consisting of aeolian sand. Earthen constructions are not permitted in either of these cases. Such constructions are highly vulnerable when under water for several days. Also, on aeolian sand, settlement and high seismic intensity is expected, which cannot be supported by the heavy, weak adobe construction. Lightweight materials such as wood and bamboo have behaved well in past earthquakes, including in Armenia, Colombia, in January 1999.

The experience of recent past disasters, such as the El Niño 1997-98 Is being taken into account. For example, San José, in the lower park of Tumbes, has been flooded several times. All adobe constructions have gone, but brick and wood and bamboo buildings have remained standing, with minor damage only A special manual is being prepared with a guide to suitable construction materials and methods, and the soil coefficient of the new 1997 Peruvian Seismic Code to be applied in each sector.

SUMMARY OF RESULTS

As of December 1999, 3 out of the 10 participating municipalities in the CEREN-UNDP Program SCO-IS have concluded the land use planning for disaster mitigation. The approval process of 2 of them is underway. It is expected that the respective municipal ordinance will be promulgated by the end of 1999. The process of the remaining 8 municipalities is to be concluded during the first semester of the year 2000. Some 10 additional cities will participate in Group B during that year.

CONCLUDING REMARKS

The method used in the development of the SCD-1S is action-oriented, simple and cheap to implement uses existing data, complemented by key field investigation. Mayors with different political tendencies ire enthusiastically participating in the Program SCD-IS as everybody wins, and good progress is being made.

It was possible to advance very quickly in 6 of the cities in Group A, because the microzonation investigations were made from 1989 to 1992 as part of Peru’s program for the IDNDR. They are located in the Grau region with an area of 41,000 Km2 and some 2 million inhabitants. The

selected cities were prioritized according to their importance and population growth rate and known physical safety problems.

Investigation was made for professional theses of civil engineering graduates at CISMID/FIC-UNI under he sponsorship of JICA. The UNCRD organized an international seminar on regional disaster mitigation held in Piura in 1991, to share this experience with participants from some 15 Latin American countries. This is only the first step on the long road to developing sustainable cities in Peru, but it tackles one of the most critical problems: human safety.

The experience of the World Bank In South East Asia, India and Turkey in developing integrated urban infrastructure and effectively handling the necessary funds from different sources, will be very useful for improving the Peruvian cities economic competitiveness in the globalized world of today and tomorrow. It will help to strengthen the administrative capability of the municipalities and assist them in prioritizing the construction of infrastructure that is urgently needed, is cost effective and is to be executed soon, but looking ahead to the medium and long range objectives.

In the Third Country Seminars, organized by CISMID/FIC-UNI and guided and funded by JICA for about 10 years, some 50 professors from regional universities have participated. Emphasis was given to microzonation and its application to urban and regional planning for disaster mitigation. So what needed is political decision on the part of local authorities of most of the important Peruvian cities to implement similar programs in order for the ongoing SCD-1S, to really have national impact in reducing risk in Peruvian urban centers.

Another important advancement is the fact the National institute of Urban Planning-INADUR has decided not to develop any urban planning without taking into consideration disaster reduction measures in all future programs.

The USC-IS is being reported to the international community as part of the Peru's program for the IDNDR as of June, 1999 (Kuroiwa, 2000), but does not include the progress of the 1999 second semester.

REFERENCES

KIJRQIWA J.; Dew, E, JAEN, H. & J. Kogan, 1978. "Microzonation Methods and Techniques Used in Peru". Proc. 2nd. Intern. Conf. on Microz. Vol. 1, PP. 341-452, San Francisco, CA.

KUROIWA, J. 1982 "Simplified Microzonation Method for Urban Planning". Proc. 3rd. Intern. Microz. Conf., pp. 753-754, Seattle, WA.

KUROIWA, J. & J. Alva, 1991. "Microzonation and its Application to Urban and Regional Planning for Disaster Mitigation in Peru". Proc. 4th. Intern. Conf. on Seismic Zonation. Vol. 1, pp. 711-794, Stanford, CA.

KUROIWA, J., 1995. "Reconciliating Man and Nature to Reduce Disasters". DHA News November-December, No. 17. Geneva.

KUROIWA. J. 2000. “Evaluation of the Outcome or the IDNDR Program and Earthquake Risk Reduction in Peru”. 12th World Conf. on Earthquake Engg. Auckland New Zealand.